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EXAMINER

BUSS, BENJAMIN J

ART UNIT	PAPER NUMBER
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2129

DATE MAILED: 08/09/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/605,979

Applicant(s)

ALVAREZ ET AL.

Examiner

Benjamin Buss

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 June 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-41 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-41 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 10/4/2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>11/11/2003</u> . | 6) <input type="checkbox"/> Other: _____ |

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DETAILED ACTION

This Office Action is in response to an AMENDMENT entered 6/9/2006 for the patent application 10/605,979 filed on 11/11/2003.

The First Office Action of 3/16/2006 is fully incorporated into this Final Office Action by reference.

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Status of Claims

Claims 1-41 are pending.

Claim Objections

Response to Arguments

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Applicant's arguments, see p14, filed 6/9/2006, with respect to the claim objections have been fully considered and are persuasive. The objection of claims 8-14 as identical to claims 1-7 has been withdrawn.

Claim Rejections - 35 USC § 112

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The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

20

Claims 7, 14, 19, 26, 33, and 40 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. These claims are directed toward the situation when "no components and no problems are selected by said user", but it is clear in the independent claims that an input **is received from the user** comprising "a selection of at least one of a common **problem** from said list and a **component** in said component hierarchy". It is clear that the situation when "no components and no problems are selected by said user" is explicitly not permitted by the independent claims.

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Therefore, it is not clear how claims 7, 14, 19, 26, 33, and 40 flow from the independent claims they depend upon.

Claim Rejections - 35 USC § 102

Response to Arguments

Applicant's arguments with respect to claims 1-41 have been considered but are moot in view of the new ground(s) of rejection.

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Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this

Office action:

35 (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

40 Claims 1-41 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Kipersztok** (USPN 6,574,537) in view of **Ridolfo** (USPAP 2003/0005486).

Claims 1, 27, 34, and 41:

45 **Kipersztok** teaches:

- maintaining a database containing history data regarding items of equipment (C1-18 especially C5:4-C6:35), said history data comprising component hierarchies (C1-18 especially "suspect components, such as LRUs or lower level components within an LRU ... can present the suspect components upon the display 14 or a prioritized listing based on the respective probabilities of failure of the suspect components" C12:40-60 and "subsystem containing the suspect components" C14:63-C15:22), failure descriptions (C1-18 especially "every component node has at least two states, (i.e. normal and failed) ... failure mode contains six mutually exclusive and exhaustive states" C11:60-C12:22; *It is clear that a set of mutually exclusive and exhaustive states is maintained for the failure mode of components*), common problems (C1-18 especially "symptoms" C9:35-67 and C14:35-62), and repair histories (C1-18 especially "maintenance actions that may also be stored in a database" C14:1-25 and "record any actions taken" C16:25-50);
- based on said history data, calculating and storing in said database failure probabilities for components in said component hierarchies and mean times between failures for said components in said component hierarchies (C1-18 especially "probability of failing of 0.00003 which is derived using appropriate probability models from observed meantime between failure" C11:62-C12:21);

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- 60 - receiving an equipment identification of an item of equipment to be repaired from a user (C1-18 especially "mechanic can enter the tail number by typing the tail number into the appropriate space, the mechanic can select one of the listed tail numbers shown" C14:26-36);
- 65 - providing said user with a list of common problems (C1-18 especially "list of possible symptoms" C14:35-62) for same type items (*Examiner acknowledges that although the reference clearly shows that the system comprehends the component hierarchy, it does not explicitly disclose providing the user with the component hierarchy*);
- 70 - receiving input from said user in response to said list of common problems and said component hierarchy, wherein said input comprises a selection of at least one of a common problem from said list and a component in said component hierarchy (C1-18 especially "mechanic therefore selects this entry from the listed symptoms" C14:36-62 and "mechanic should decide whether to defer maintenance (such as in instances in which the component is not on the minimum equipment list), to fix the component, or to remove or replace the component" C16:5-25 and "listing the suspect subsystems and the interface may be capable of receiving input indicative of the respective suspect subsystem to be further analyzed" C6:15-37);
- 75 - in response to said input from said user, searching said database for detailed information that matches said selection for said item of equipment and for other same type items of equipment (C1-18 especially "identifying additional information relating to at least one suspect component" C5:3-C6:35 and "diagnostic model is executed and a number of suspect components are identified" C14:60-C15:25 and "provide one or more tests that can be performed" C15:20-60 and "mechanic selects the details feature and the diagnostic system and method accesses the database" C17:20-65); and
- 80 - providing said user with said detailed information (C1-18 especially "displaying the schematic images, the display may also indicate the relative likelihood of component failure ... text descriptions of the suspect components which can also be presented upon the display for review by the mechanic" C5:3-C6:35 and "presented in a prioritized listing" C14:60-C15:25 and "displays the test procedure steps" C15:20-60 and "displays the selected schematic image" C17:20-65).
- 85 **Kipersztok fails to teach:**
- providing said user with a component hierarchy for same type items;

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Ridolfo teaches:

- maintaining a database containing history data regarding items of equipment, said history data comprising component hierarchies (p1-7 especially "'drill down' display" ¶100 and "overall (plant-wide) health status" ¶104 and "any of the component boxes may be selected and interrogated" ¶108 and "display indicates the health status of all the sub-component" ¶109 and "any of the sub-components 35 may be selected to access lower-tier supporting information pages" ¶111 and "multi-tier display hierarchy" ¶130 & ¶141; Also see Figures 4-9 which show how a user can "drill down" displays from the overall system health status of FIG 4 by choosing a component such as "CHARGING PUMP 1A" to see the related sub-component health in FIG 5, in which the user can subsequently select a sub-component such as "BEARING" to see a listing of various features and common problems that are related to the sub-component in FIG 6, which allows the user to select a feature such as "AXIAL ASYMMETRY" to see current sensor data on the feature in FIG 9), failure descriptions (p1-7 especially "specific details on the faults (types of failures)" ¶90 and "probability of failure for each of the faults ... presented in a hierarchy" ¶112 and "failure status" ¶130), common problems (p1-7 especially "probability of failure for each of the faults ... presented in a hierarchy" ¶112 and "faults" in FIG 6), and repair histories (p1-7 especially "historical data, a maintenance log" ¶11 and "maintenance records" ¶100);
- based on said history data, calculating and storing in said database failure probabilities for components in said component hierarchies and mean times between failures for said components in said component hierarchies (p1-7 especially "probability of failure for each of the faults" ¶112 and "an expected time to failure, an upper bound of the predicted time to failure and a lower bound of the predicted time to failure are presented for each sub-component" ¶9 and "Statistical Process Analysis" ¶57-¶59; *Examiner points out that although mean time between failures is not explicitly recited, an expected time to failure is equivalent to the mean time between failures minus the time that the component/sub-component has been used*);
- providing said user with a list of common problems and a component hierarchy for same type items (p1-7 especially "'drill down' display" ¶100 and "overall (plant-wide) health status" ¶104 and "any of the component boxes may be selected and interrogated" ¶108 and "display indicates the health status of all the sub-component" ¶109 and "any of the sub-components 35 may be selected to access lower-tier supporting information pages" ¶111 and "multi-tier display hierarchy" ¶130 & ¶141; Also see Figures 4-9 which show

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- 115 how a user can "drill down" displays from the overall system health status of FIG 4 by choosing a component such as "CHARGING PUMP 1A" to see the related sub-component health in FIG 5, in which the user can subsequently select a sub-component such as "BEARING" to see a listing of various features and common problems that are related to the sub-component in FIG 6, which allows the user to select a feature such as "AXIAL ASYMMETRY" to see current sensor data on the feature in FIG 9);
- 120 - receiving input from said user in response to said list of common problems and said component hierarchy, wherein said input comprises a selection of at least one of a common problem from said list and a component in said component hierarchy (p1-7 especially "any of the component boxes may be selected and interrogated" ¶108 and "any of the sub-components 35 may be selected" ¶111);
- in response to said input from said user, searching said database for detailed information that matches said selection for said item of equipment and for other same type items of equipment (p1-7 especially "prevailing failure modes" ¶108 and "access lower-tier supporting information pages" ¶111); and
- 125 - providing said user with said detailed information (p1-7 especially "display" ¶108-¶111; Also see Figures 4-9).

Motivation:

- 130 **Kipersztok** and **Ridolfo** are from the same field of endeavor, system maintenance. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of **Kipersztok** by presenting the user with the component hierarchy such that components may be selected from the component hierarchy for further analysis as taught by **Ridolfo** for the benefit of adequately presenting such information to the operations staff in a convenient and readily understandable manner to provide an
- 135 indication of the health of the complex system being maintained (**Ridolfo** ¶6-¶8).

Claim 8:

In addition to the limitations of claim 1 taught by the combination of **Kipersztok** and **Ridolfo** as detailed above,

Kipersztok teaches:

- 140 - providing said user with said detailed information, wherein if said selection comprises said component (C1-18 especially "In a few instances involving common or repeated problems, an experienced mechanic may be able to immediately identify the suspect LRU based only upon the problem and the accompanying

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145 symptoms" C3:5-15 and "receiving input indicative of the respective suspect subsystem to be further analyzed" C6:15-27; *Examiner notes that it would have been obvious to the person of ordinary skill in the art at the time the invention was made to allow the direct selection of the component by an experienced mechanic who is able to immediately identify the suspected component and wishes to get straight to the detailed information regarding that component, such as details on the recent successful repairs*), said detailed information comprises the number of failures (C1-18 especially "components are presented in a prioritized listing based upon the relative likelihood that the failure of each suspect component caused the observed symptoms" C15:1-22 and "summary log indicates the suspect component (designated the probable causes)" C16:25-50 and "number of different subsystems may be implicated" C16:50-67 and "number of intermediate nodes interconnecting the nodes for the components and the nodes for the observed symptoms. The intermediate nodes represent the failure state of a switch, valve, duct or the like. Based upon the failure state of a component, the intermediate nodes may interconnect the node(s) representing one or more components with the node(s) representing one or more of the observed symptoms in an acyclic manner" C11:1-17), the probability of failure (C1-18 especially "probability of failing of 0.00003 which is derived using appropriate probability models from observed meantime between failure" C11:62-C12:21), the mean time between failures (C1-18 especially "probability of failing of 0.00003 which is derived using appropriate probability models from observed meantime between failure" C11:62-C12:21) for said component in said item of equipment and in said other same type items.

Kipersztok fails to teach:

- wherein said detailed information comprises the occurrence of the most recent failure and the next expected failure for each component.

Ridolfo teaches:

- 165 - providing said user with said detailed information, wherein if said selection comprises said component (p1-7 especially "display" ¶108-¶111 and "any of the component boxes may be selected and interrogated" ¶108; Also see Figures 4-9), said detailed information comprises the number of failures (p1-7 especially "health status 34 for each component is designated on the display" ¶104 and "display page 18 depicts the fault status for each of the sub-components" ¶112), the probability of failure (p1-7 especially "probability of failure for each of the faults" ¶112), the mean time between failures (p1-7 especially "an expected time to
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failure, an upper bound of the predicted time to failure and a lower bound of the predicted time to failure are presented for each sub-component" ¶9 and "Statistical Process Analysis" ¶57-¶59; *Examiner points out that although mean time between failures is not explicitly recited, an expected time to failure is equivalent to the mean time between failures minus the time that the component/sub-component has been used*), the occurrence of the most recent failure (p1-7 especially "Maintenance activities previously performed may be viewed as well" ¶120 and "displays historical sensor data associated with a selected component" ¶119), and the next expected failure (p1-7 especially "schedule future maintenance periods" ¶120 and "display include a predicted time to failure for each of the sub-components and may be sequentially arranged according to such predicted time to failure. In the exemplary system an expected time to failure, an upper bound of the predicted time to failure and a lower bound of the predicted time to failure are presented for each sub-component" ¶9) for said component in said item of equipment and in said other same type items.

Motivation:

Kipersztok and **Ridolfo** are from the same field of endeavor, system maintenance. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of **Kipersztok** by presenting the user with the component hierarchy such that components may be selected from the component hierarchy for further analysis and displaying information on the next expected failure as taught by **Ridolfo** for the benefit of adequately presenting such information to the operations staff in a convenient and readily understandable manner to provide an indication of the health of the complex system being maintained (**Ridolfo** ¶6-¶8).

Claim 15:

In addition to the limitations of claim 1 taught by the combination of **Kipersztok** and **Ridolfo** as detailed above,

Kipersztok teaches:

- providing said user with said detailed information,
 - o wherein if said selection comprises said component alone (C1-18 especially "In a few instances involving common or repeated problems, an experienced mechanic may be able to immediately identify the suspect LRU based only upon the problem and the accompanying symptoms" C3:5-15 and "receiving input indicative of the respective suspect subsystem to be further analyzed" C6:15-

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27; Examiner notes that it would have been obvious to the person of ordinary skill in the art at the time the invention was made to allow the direct selection of the component by an experienced mechanic who is able to immediately identify the suspected component and wishes to get straight to the detailed information regarding that component, such as details on the recent successful repairs), said detailed information comprises the number of failures (C1-18 especially "components are presented in a prioritized listing based upon the relative likelihood that the failure of each suspect component caused the observed symptoms" C15:1-22 and "summary log indicates the suspect component (designated the probable causes)" C16:25-50 and "number of different subsystems may be implicated" C16:50-67 and "number of intermediate nodes interconnecting the nodes for the components and the nodes for the observed symptoms. The intermediate nodes represent the failure state of a switch, valve, duct or the like. Based upon the failure state of a component, the intermediate nodes may interconnect the node(s) representing one or more components with the node(s) representing one or more of the observed symptoms in an acyclic manner" C11:1-17), the probability of failure (C1-18 especially "probability of failing of 0.00003 which is derived using appropriate probability models from observed meantime between failure" C11:62-C12:21), the mean time between failures (C1-18 especially "probability of failing of 0.00003 which is derived using appropriate probability models from observed meantime between failure" C11:62-C12:21) for said component in said item of equipment and in said other same type items, and

- o wherein if said selection comprises said common problem alone (C1-18 especially "mechanic therefore selects this entry from the listed symptoms" C14:36-62), said detailed information comprises the number of failures (C1-18 especially "components are presented in a prioritized listing based upon the relative likelihood that the failure of each suspect component caused the observed symptoms" C15:1-22 and "summary log indicates the suspect component (designated the probable causes)" C16:25-50 and "number of different subsystems may be implicated" C16:50-67 and "number of intermediate nodes interconnecting the nodes for the components and the nodes for the observed symptoms. The intermediate nodes represent the failure state of a switch, valve, duct or the like. Based upon the failure state of a component, the intermediate nodes may

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interconnect the node(s) representing one or more components with the node(s) representing one or more of the observed symptoms in an acyclic manner" C11:1-17), the probability of failure (C1-18 especially "probability of failing of 0.00003 which is derived using appropriate probability models from observed meantime between failure" C11:62-C12:21), the mean time between failures (C1-18 especially "probability of failing of 0.00003 which is derived using appropriate probability models from observed meantime between failure" C11:62-C12:21) for said component in said item of equipment and in said other same type items that are associated with said common problem;

- receiving additional input from said user regarding repair of said item of equipment and repair of said other same type items (C1-18 especially "record whatever remedial action was taken" C6:25-40 and "mechanic to record the actions taken" C14:1-30 and "mechanic enters the outcome of the text" C15:55-67);
 - based on said additional input, updating said repair histories in said database (C1-18 especially "refined in light of the additional field data" C14:1-30 and "will then again determine the suspect components and their respective probabilities based not only upon the observed symptoms, but also upon the outcome of the test" C16:1-25 and "maintains all of the information that is collected regarding maintenance operations for a maintenance logbook as well as for further refinement of the diagnostic model" C18:1-25); and
 - recalculating and storing said failure probabilities and said mean times between failures, wherein said recalculating of said mean times between failures comprises ignoring repairs where the same problem occurred within a predetermined time of the most recent failure (C1-18 especially "probabilities and interrelationships between the various nodes of the diagnostic model can be refined in light of the additional field data" C14:1-30 and "refined in light of the additional field data" C14:1-30 and "probability update algorithm" C10:1-30 and "maintains all of the information that is collected regarding maintenance operations for a maintenance logbook as well as for further refinement of the diagnostic model" C18:1-25;
- Additionally, it would have been notoriously obvious to one of ordinary skill in the art at the time the invention was made to update statistics such as failure probabilities and mean time between failures when repairs are made in order to keep the statistical data accurate. Also, it would have been notoriously obvious to one of ordinary skill in the art to recognize that problems that remain after a repair is completed are not actually fixed, and thus only repairs resulting in successfully fixing the problem should be taken into*

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account. The amount of time needed to test the equipment can be interpreted to be "within a predetermined time" for the purposes of examination).

Kipersztok fails to teach:

- wherein said detailed information comprises the occurrence of the most recent failure and the next expected failure for each component.

Ridolfo teaches:

- providing said user with said detailed information,
 - o wherein if said selection comprises said component alone (p1-7 especially "display" ¶108-¶111 and "any of the component boxes may be selected and interrogated" ¶108; Also see Figures 4-9), said detailed information comprises the number of failures (p1-7 especially "health status 34 for each component is designated on the display" ¶104 and "display page 18 depicts the fault status for each of the sub-components" ¶112), the probability of failure (p1-7 especially "probability of failure for each of the faults" ¶112), the mean time between failures (p1-7 especially "an expected time to failure, an upper bound of the predicted time to failure and a lower bound of the predicted time to failure are presented for each sub-component" ¶9 and "Statistical Process Analysis" ¶57-¶59; *Examiner points out that although mean time between failures is not explicitly recited, an expected time to failure is equivalent to the mean time between failures minus the time that the component/sub-component has been used*), the occurrence of the most recent failure (p1-7 especially "Maintenance activities previously performed may be viewed as well" ¶120 and "displays historical sensor data associated with a selected component" ¶119), and the next expected failure (p1-7 especially "schedule future maintenance periods" ¶120 and "display include a predicted time to failure for each of the sub-components and may be sequentially arranged according to such predicted time to failure. In the exemplary system an expected time to failure, an upper bound of the predicted time to failure and a lower bound of the predicted time to failure are presented for each sub-component" ¶9) for said component in said item of equipment and in said other same type items, and
 - o wherein if said selection comprises said common problem alone (p1-7 especially "Fault Display ... rapidly accessed ¶112-113), said detailed information comprises the number of failures (p1-7

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especially "health status 34 for each component is designated on the display" ¶104 and "display page 18 depicts the fault status for each of the sub-components" ¶112), the probability of failure (p1-7 especially "probability of failure for each of the faults" ¶112), the mean time between failures (p1-7 especially "an expected time to failure, an upper bound of the predicted time to failure and a lower bound of the predicted time to failure are presented for each sub-component" ¶9 and "Statistical Process Analysis" ¶57-¶59; *Examiner points out that although mean time between failures is not explicitly recited, an expected time to failure is equivalent to the mean time between failures minus the time that the component/sub-component has been used*), the occurrence of the most recent failure (p1-7 especially "Maintenance activities previously performed may be viewed as well" ¶120 and "displays historical sensor data associated with a selected component" ¶119), and the next expected failure (p1-7 especially "schedule future maintenance periods" ¶120 and "display include a predicted time to failure for each of the sub-components and may be sequentially arranged according to such predicted time to failure. In the exemplary system an expected time to failure, an upper bound of the predicted time to failure and a lower bound of the predicted time to failure are presented for each sub-component" ¶9) for said component in said item of equipment and in said other same type items that are associated with said common problem, and;

Motivation:

Kipersztok and **Ridolfo** are from the same field of endeavor, system maintenance. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of **Kipersztok** by presenting the user with the component hierarchy such that components may be selected from the component hierarchy for further analysis and displaying information on the next expected failure as taught by **Ridolfo** for the benefit of adequately presenting such information to the operations staff in a convenient and readily understandable manner to provide an indication of the health of the complex system being maintained (**Ridolfo** ¶6-¶8).

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Claim 20:

In addition to the limitations of claim 1 taught by the combination of **Kipersztok** and **Ridolfo** as detailed above,

Kipersztok teaches:

- 310 - providing said user with said detailed information, wherein if said selection comprises said common
problem alone (C1-18 especially "mechanic therefore selects this entry from the listed symptoms" C14:36-
62), said detailed information comprises the number of failures (C1-18 especially "components are
presented in a prioritized listing based upon the relative likelihood that the failure of each suspect
component caused the observed symptoms" C15:1-22 and "summary log indicates the suspect component
315 (designated the probable causes)" C16:25-50 and "number of different subsystems may be implicated"
C16:50-67 and "number of intermediate nodes interconnecting the nodes for the components and the
nodes for the observed symptoms. The intermediate nodes represent the failure state of a switch, valve,
duct or the like. Based upon the failure state of a component, the intermediate nodes may interconnect the
node(s) representing one or more components with the node(s) representing one or more of the observed
320 symptoms in an acyclic manner" C11:1-17), the probability of failure (C1-18 especially "probability of failing
of 0.00003 which is derived using appropriate probability models from observed meantime between failure"
C11:62-C12:21), the mean time between failures (C1-18 especially "probability of failing of 0.00003 which
is derived using appropriate probability models from observed meantime between failure" C11:62-C12:21)
for said component in said item of equipment and in said other same type items that are associated with
325 said common problem;

Kipersztok fails to teach:

- wherein said detailed information comprises the occurrence of the most recent failure and the next expected failure for each component.

Ridolfo teaches:

- 330 - providing said user with said detailed information, wherein if said selection comprises said common
problem alone (p1-7 especially "Fault Display ... rapidly accessed ¶112-113), said detailed information
comprises the number of failures (p1-7 especially "health status 34 for each component is designated on
the display" ¶104 and "display page 18 depicts the fault status for each of the sub-components" ¶112), the
probability of failure (p1-7 especially "probability of failure for each of the faults" ¶112), the mean time

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335 between failures (p1-7 especially "an expected time to failure, an upper bound of the predicted time to failure and a lower bound of the predicted time to failure are presented for each sub-component" ¶9 and "Statistical Process Analysis" ¶57-¶59; *Examiner points out that although mean time between failures is not explicitly recited, an expected time to failure is equivalent to the mean time between failures minus the time that the component/sub-component has been used*), the occurrence of the most recent failure (p1-7
340 especially "Maintenance activities previously performed may be viewed as well" ¶120 and "displays historical sensor data associated with a selected component" ¶119), and the next expected failure (p1-7 especially "schedule future maintenance periods" ¶120 and "display include a predicted time to failure for each of the sub-components and may be sequentially arranged according to such predicted time to failure. In the exemplary system an expected time to failure, an upper bound of the predicted time to failure and a
345 lower bound of the predicted time to failure are presented for each sub-component" ¶9) for said component in said item of equipment and in said other same type items that are associated with said common problem.

Motivation:

Kipersztok and **Ridolfo** are from the same field of endeavor, system maintenance. It would have been
350 obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of **Kipersztok** by presenting the user with the component hierarchy such that components may be selected from the component hierarchy for further analysis and displaying information on the next expected failure as taught by **Ridolfo** for the benefit of adequately presenting such information to the operations staff in a convenient and readily understandable manner to provide an indication of the health of the complex system being
355 maintained (**Ridolfo** ¶6-¶8).

Claims 2, 9, 16, 21, 28, and 35:**Ridolfo** teaches:

- wherein said receiving of said input from said user further comprises allowing said user to browse through
360 multiple levels of said component hierarchy and select at least one component from any level of said component hierarchy (p1-7 especially "'drill down' display" ¶100 and "overall (plant-wide) health status" ¶104 and "any of the component boxes may be selected and interrogated" ¶108 and "display indicates the

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health status of all the sub-component" ¶109 and "any of the sub-components 35 may be selected to access lower-tier supporting information pages" ¶111 and "multi-tier display hierarchy" ¶130 & ¶141; Also see Figures 4-9 which show how a user can "drill down" displays from the overall system health status of FIG 4 by choosing a component such as "CHARGING PUMP 1A" to see the related sub-component health in FIG 5, in which the user can subsequently select a sub-component such as "BEARING" to see a listing of various features and common problems that are related to the sub-component in FIG 6, which allows the user to select a feature such as "AXIAL ASYMMETRY" to see current sensor data on the feature in FIG 9).

Claims 3, 10, 22, 29, and 36:**Kipersztok teaches:**

- wherein said process of providing said detailed information includes providing detailed information for similar equipment (C1-18 especially "experiential information is typically provided by experienced mechanics or engineers who have extensive experience troubleshooting a particular model of aircraft" C9:35-67 and C9:4-15 and C18:20-24 and C14:25-35; *Examiner points out that the diagnostic system maintains all maintenance operations for multiple systems, such that the mechanic must identify the tail number of the system being worked on, so the system clearly uses information for similar equipment when modeling the current system*).

Claims 4, 11, 23, 30, and 37:**Kipersztok teaches:**

- wherein if said selection comprises said common problem, said detailed information further comprises all successful repairs related to said problem, with the most recent successful repairs being listed first (C1-18 especially C16:26-49 and C15:32-47; Also see Figures 5M-5O; *Examiner notes that repairs of suspected components are listed in order of the likelihood they will be successful in repairing the problem causing the observed symptoms*).

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Claims 5, 12, 17, 24, 31, and 38:390 **Ridolfo** teaches:

- wherein if no problem is selected by said user, said detailed information comprises all successful repairs matching any component selected by said user (p1-7 especially "Individual failure mechanisms (faults) for each sub-component are identified in the Tier 2 displays. This allows a better understanding of the failure process so that corrective actions can be taken to avoid, or minimize, the subsequent reoccurrence of similar failures" ¶138 and "repair planning purposes" ¶141 and "Maintenance activities previously performed may be viewed" ¶120).

Claims 6, 13, 18, 25, 32, and 39:**Kipersztok** teaches:

- 400 - wherein if no components are selected by said user, said detailed information comprises all successful repairs of major components matching any problem selected by said user (C1-18 especially C16:26-49 and C15:32-47; Also see Figures 5M-5O & 6).

Claims 7, 14, 19, 26, 33, and 40:405 **Ridolfo** teaches:

- wherein if no components and no problems are selected by said user, said detailed information comprises all successful repairs of major components with the most recent successful repairs being listed first (p1-7 especially "Maintenance activities previously performed may be viewed" ¶120; *It would have been obvious to one of ordinary skill in the art to list historical repairs in reverse chronological order so that a mechanic wanting to repeat the last repair on a similar problem could easily pull it up and get to work*).

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly,

THIS ACTION IS MADE FINAL. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as

415 set forth in 37 CFR 1.136(a).

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A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- Hooks (USPN 6,532,426)
- Fujiyama (USPAP 2003/0191606)
- Bechhoefer (USPAP 2003/0074159)
- House (USPN 6,834,256)
- Ramadei (USPN 6,907,545)

Claims 1-41 are rejected.

Correspondence Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Benjamin Buss whose telephone number is 571-272-5831. The examiner can normally be reached on M-F 9AM-5PM.

As detailed in MPEP 502.03, communications via Internet e-mail are at the discretion of the applicant. Without a written authorization by applicant in place, the USPTO will not respond via Internet e-mail to any Internet correspondence which contains information subject to the confidentiality requirement as set forth in 35 U.S.C. 122. A paper copy of such correspondence will be placed in the appropriate patent application. The following is a sample authorization form which may be used by applicant:

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445 If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Vincent
can be reached on 571-272-3080. The fax phone number for the organization where this application or proceeding
is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information
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